

18 August 2021

United State Department of Transportation
Docket Management System
1200 New Jersey Avenue, SE
West Building Ground Floor, Room W12-140
Washington, DC 20590

RE: Exemption Request Pursuant to 49 USC Section 44807 (Special Authority for Certain Unmanned Systems)

To whom it may concern:

In response to the decision dated 28 July 2022, Vector Disease Control International, a Rentokil Company, (VDCI) is submitting this response. VDCI is requesting, pursuant to the FAA Reauthorization Act of 2018, § 44807 and 14 C.F.R. Part 1, a Grant of Exemption from the Federal Aviation Regulations (“FARs”) as identified below. VDCI requests authorization to operate our UAS, the PrecisionVision 35, during daylight hours (30-minutes after official sunset and 30-minutes before sunrise), under VFR conditions. Operations will not be conducted directly over populated areas and the PrecisionVision UAS weight will exceed 55 pounds but no more than 79 pounds, for aerial agricultural operations in remote operating environments.

The relief requested in this Petition is similar to that granted in Exemption No. 11448 to Yamaha Motor Corporation, USA (“the Yamaha Exemption”) with two main differences. VDCI proposes to use a PIC that holds a Part 107 remote pilot certificate, rather than an airline transport, commercial, private, recreational or sport pilot certificate, that was required in the Yamaha Exemption. VDCI seeks relief which would allow a single pilot to act as PIC. In this regard, the relief would be akin to that granted in Waiver No. 107W-2016-01297, except that the UAS weight is over 55 pounds, but no more than 79 pounds.

Furthermore, the relief requested is similar to that granted to Leading Edge Aerial Technologies, Inc. in Exemption No. 18779 (Regulatory Docket No. FAA-2019-0275). VDCI uses only the Leading Edge, PrecisionVision 35 UAS and each aircraft is currently listed on VDCI’s Title 14, Code of Federal Regulations (14 CFR) part 137 Letter of Authorization (LOA).). VDCI will adhere to all conditions and limitations of our existing Exemption No. 18625 except that our operations will have a maximum take-off weight over 55 pounds, but no more than 79 pounds.

Exemptions from Regulations Requested:

FAR's Relative to UAS:

45.23 Marking of the aircraft

Applicable codes of Federal Regulation require aircraft to be marked according to certain specifications. VDCI UASs are, by definition, unmanned. They therefore do not have a cabin, cockpit or pilot station on which to mark certain words or phrases. Further, two-inch lettering is difficult to place on such small aircraft. Regardless, VDCI will mark its UASs in the largest possible lettering by placing all appropriate Registration Numbers on its air frame as required by 14 CFR 45.29 (f) so that the pilot, visual observer and others working with the UAV will see the markings. The FAA has previously issued exemptions to this regulation through Exemptions# 8738, 10167, 10167A and 10700.

91.7(a) Civil aircraft airworthiness

There is no airworthiness certificate issued for the PrecisionVision UAS. VDCI seeks an exemption from FAR § 91.7(a) Civil aircraft airworthiness, which requires that a civil aircraft be in an airworthy condition to be operated. While the UAS operated by VDCI will not have an airworthiness certificate, consistent with the FAA's determination in the Yamaha Exemption, the pilot will determine the UA is in an airworthy condition prior to each flight. As described more fully in the operating documents, this is achieved through adherence to VDCI and the UAS manufacturer's pre-flight checklist, and the enhanced pilot training requirements of the VDCI Pilot Training Program.

91.9 (b)(2) Civil aircraft flight manual, marking, and placard requirements

VDCI seeks relief from 91.9 (b)(2) which requires an aircraft flight manual in the aircraft. As there are no pilots or passengers, and given the size on the UASs, this Regulation is inapplicable. An equivalent level of safety will be achieved by maintaining a manual at the home base and having the manual in the remote pilot's possession when operating. The FAA has previously issued exemptions to this regulation in Exemption# 8607, 8737, 8738, 9299, 9299A, 9565, 95658, 10167A, 10602, 10700 and 32827.

91.119(c) Minimum safe altitudes

VDCI also seeks an exemption from FAR § 91.119(c) Minimum safe altitudes, to the extent necessary to allow UAS operations over other than congested areas at altitudes lower than those permitted by rule. The ability to operate at those altitudes is one of the key benefits of using UAS for the proposed agricultural activities. An equivalent or greater level of safety will be achieved given the size, relatively light weight, and slow

speed of the UAS, as well as the controlled location where the operations will occur. As described in the previously supplied operating documents, VDCI UASs will never operate at an altitude greater than 400 AGL. VDCI will, however, operate its UASs in sparsely populated areas and never endanger the person or property of another, we will also cease operations if non-participating public enters our operational area, this will enable us to provide a level of safety at least equivalent to those in relation to minimum safe altitudes. VDCI tries to maintain an operating altitude less than 50 feet AGL during its spraying operations. That altitude is only increased when exercising caution and issuing a Return-to-Home (RTH) command to the UAS, which causes the UAS to ascend to an altitude of 100' or more AGL before returning home, but no more than 200' AGL unless within 500' of an obstruction whereby the UAS can climb 200' above the obstruction. These maximum altitudes provide an extremely high level of safety from any obstruction incursion.

91.121 Altimeter Settings

VDCI requests an exemption from FAR § 91.121 Altimeter settings, which require a person operating an aircraft to maintain cruising altitude or flight level by reference to an altimeter that is set to the elevation of the departure airport or barometric pressure (density altitude). In the Yamaha Exemption, the FAA stated that an equivalent level of safety to the requirements of FAR § 91.121 can be achieved in circumstances where the PIC uses an alternative means for measuring and reporting UA altitude, such as global positioning system (GPS). The UAS that VDCI uses for performing the proposed operations will be equipped with double redundancy GPS and two IMU or other equipment for measuring and reporting UAS altitude, and the PIC will check the UA altitude reading prior to each takeoff. The takeoff altitude is always set at a relative local value of 0'. All other waypoint and flight positions are relative to the 0' altitude home position. Consistent with previously granted exemptions, these requirements ensure that an equivalent level of safety will be achieved, and an exemption from the requirements of FAR § 91.121 is therefore appropriate.

91.151(b) Fuel requirements for flight in VFR conditions

VDCI seeks an exemption from FAR § 91.151(b) Fuel requirements for flight in VFR conditions, which would otherwise require a 20-minute fuel reserve to be maintained. The FAA has previously determined that a requirement prohibiting the PIC from beginning a UAS flight unless (considering wind and forecast weather conditions) there was enough available power for UAS to operate for the intended operational time and to operate after that for at least four minutes or with the reserve power recommended by the manufacturer if greater would ensure an equivalent level of safety to the fuel requirements of FAR § 91.151. Refer to the Yamaha Exemption on pg. 16. VDCI will

adhere to the same reserve power requirement and an exemption from FAR § 91.151's fuel requirements for flight in VFR conditions is therefore appropriate.

91.203 (a) and (b) Civil aircraft: Certifications required

VDCI seeks relief from 91.203 (a) and (b) as it provides for the carrying of civil aircraft certifications and registrations. They are inapplicable for the same reasons described elsewhere in this request. The equivalent level of safety will be achieved by maintaining such certifications and registrations at VDCI home base in the remote pilot's possession.

91.405(a) Maintenance required

VDCI seeks an exemption from the following maintenance and inspection-related FARs: §§ 91.405(a) Maintenance required, 91.407(a)(1) Operation after maintenance, preventive maintenance, rebuilding, or alteration, 91.409(a)(1) and (2) Inspections, and 91.417(a) and (b) Maintenance records. These regulations specify maintenance, inspection, and records standards in reference to FAR § 43.6. An exemption from these regulations is needed because Part 43 and these sections only apply to aircraft with an airworthiness certificate, which the UAS to be operated under this exemption will not have, and because compliance with these regulatory provisions in the context of UAS operations is not feasible.

91.405(a) 91.407(a)(1) 91.409(a)(1) and (2) 91.417(a) and (b) Operation after maintenance, preventive maintenance, rebuilding and inspections Maintenance record In the Yamaha Exemption, the FAA determined that the proposed UAS operations required exemption from FAR §§ 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), and that the achievement of an adequate level of safety required certain conditions and limitations. VDCI has proposed in this Petition a number of limitations related to maintenance, inspections, and records which it believes provide a level of safety at least equivalent to that provided by FAR §§ 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b). For this reason, and consistent with the exemption granted from these sections in the Yamaha Exemption, VDCI requests an exemption from these sections subject to the Yamaha Exemption Limitations, without having to perform the inspections and maintenance items required by FAR §§ 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b).

VDCI also requests exemptions from the following FARs in Parts 107 and 137 that it was previously granted an exemption to in Exemption No. 18625: §§ 107.36 Carriage of hazardous material; 137.19(c), (d), (e)(2)(ii), (e)(2)(iii), and (e)(2)(v) Certification requirements; 137.31(a) and (b) Aircraft requirements; 137.33(a) and (b) Carrying of certificate; 137.41(c) Pilot in Command; and 137.42 Fastening of safety belts and shoulder harnesses.

FAR's Relative to Parts 107 and 137 Certificate:

107.36 Carriage of hazardous material

VDCI seeks relief from 107.36 consistent with the FAA's prior analysis of VDCI's Exemption, the relief shall be limited to the use of any economic poison as defined in § 137.3. Prior to operating any small UAS, VDCI will notify the Flight Standards District Office (FSDO) that holds its agricultural aircraft operator certificate. Operations will then be limited to the small UAS listed on the operator's Title 14, Code of Federal Regulations (14 CFR) part 137 Letter of Authorization (LOA).

137.19(c), (d), (e)(2)(ii), (e)(2)(iii), and (e)(2)(v) Certification requirements and 137(c) Personnel

VDCI seeks relief from § 137.19(c) to permit persons holding a remote PIC certificate with sUAS rating to act as PIC for commercial agricultural aircraft operations when utilizing a small UAS to conduct the operations. Reference to the Yamaha exemption, page 16, the FAA found that a commercial or airline transport certificate that § 137.19(c) requirement was not a reasonable requirement for UAS agricultural operations. Consistent with the FAA's prior analysis, compliance with the requirements of part 107, subpart C, the additional knowledge and applicable skill requirements in FAR § 137.19(e)(1) and (2)(i), (iv) and (vi), and compliance with the training requirements in VDCI's operating documents. The operational training document, flight training simulator and actual onsite flight training will ensure that an equivalent level of safety will be maintained. This training will not be limited to simply flight training. The training also encompasses both liquid and dry material application training specific to droplet spectrum analysis and control, swath width measurements, application rates, payload management and gross weight emergency maneuvers.

VDCI requests an exemption from the knowledge and skill test requirements in § 137.19(e)(2)(ii), (iii), and (v) Certification requirements. These requirements are not applicable to the proposed UAS operations. The Chief Pilot and UAS Coordinator of VDCI is authorized by the supervising FAA FSDO to provide sign off of a PIC who demonstrates to the Chief Pilot, competent command and the necessary skills to safely operate all aspects of the UAS operation. Therefore, VDCI also requests relief from the associated knowledge and skill test requirements of 137.41(c) based on the relief of 137.19(e)(2)(ii), (iii), and (v).

137.31 (a) Aircraft requirements

Consistent with the FAA's prior analysis of VDCI's Exemption the UAS will not have an airworthiness certificate. The safe and successful operation of the UAS will be achieved based upon guidelines set in the operating documents and a thorough pre-flight inspection prior to each flight. An extensive safety record, proving the components reliably, structural and design safety features. The historical flight data sets ensure that this exemption will not adversely impact or compromise safety.

137.31 (b) and 137.42 Aircraft requirements and Fastening of safety belts and shoulder harnesses

VDCI seeks relief from exemption 137.31(b) Aircraft requirements, and 137.42 Fastening of safety belts and shoulder harnesses, which relate to the installation and use of a shoulder harness and safety belt on an aircraft. An exemption from these requirements is warranted as UAS do not have an onboard pilot. These regulations are intended to ensure the safety of the onboard pilot during manned agricultural aircraft operations. For this reason, and based on the prior VDCI exemption granted, requested relief from 137.31(b) and 137.42 are justifiable and will not compromise safety.

137.33(a) and (b) Carrying of certificate

VDCI requests relief from 137.33(a) and (b) Carrying of certificate, which requires an agricultural aircraft operator certificate be carried on the aircraft. The FAA has previously determined that relief from 91.9(b)(2) and 91.203(a) and (b) for the carriage of the aircraft flight manual and aircraft registration onboard the aircraft is not necessary. Consistent with the FAA's prior analysis of VDCI's Exemption, relief is warranted. All other documents and certificates of registration will be kept in a location, onsite of the operation and accessible to any authorized authority requesting these documents.

Public Interest

For the following reasons, granting the requested relief in this petition for exemption would be in the public interest:

1. *Accessibility:* Operating in areas that are inaccessible by ground and conventional manned aircraft are not possible and very often unsafe for people. The use of unmanned aircraft to navigate and apply products has proven to be effective, efficacious, and economical in agriculture, mosquito control and noxious weed control.
2. *Public Health:* Many of the mosquito species that transmit viral diseases such West Nile virus, St. Louis encephalitis and Zika, breed in locations that are impossible to

effectively treat. UAS have enabled agencies like ours and our aerial application services to control these mosquito species with great efficiency and effectiveness.

3. *Safety*: The treatment areas we are often required to operate in are dangerous for humans to traverse on foot or in ATV's due to habitats such as steep hills, marshes, cliffs, rattle snakes and other threats to human health and safety. Numerous accidents occur each year when technicians are on foot, carrying 40lbs of material in a backpack sprayer or are navigating an ATV through deep, muddy bogs attempting to apply products in a uniform manner. These treatments are frequently ineffective and expose technicians to serious injury.

4. *Financial costs*: Many of the areas the UAS are treating are smaller acreage sites. These acres can be treated with manned aircraft but are so expensive to treat based on the aerial applicators minimum charge. UAS proved to be more cost effective than manned aircraft, on average saving more than 34% per acre.

5. *Financial health costs*: Due to the dangerous areas being treated by UAS, the workers compensation costs are minimized. Back injuries, knee and ankle injuries are common each year. In recent years, UAS applications proved operationally safe both in the operational applications and in employee injury exposure.

6. *Environmental Stewardship*: Federal & State Wildlife, Fish and Game allow mosquito control agencies access to treat public land for mosquito control purposes. However, the terrestrial footprint of vehicles, ATV's and other equipment on these lands has proven to be a problem for these agencies. In recent years, UAS applications eliminated the need to deploy heavy equipment that leave tracks accessing and treating these sensitive lands.

7. *Endangered species and wildlife*: Many bird strikes and wildlife disruption are caused by manned aircraft during low level aerial applications. UAS have proven to eliminate these issues. Observations and videos of UAS applications in 2018 and 2019 demonstrated the non- disruptive compatibility of UAS when performing low aerial applications in these wildlife habitats. Not a single bird strike or encounter has occurred in more than 3,000 flights.

VDCI Background and the PrecisionVision 35 UAS

VDCI operates the largest fleet of fixed-wing mosquito control aircraft in the world and annually treats over 4 million acres. Our aerial application specialists have more than 100 years in combined aerial application experience, over 18,000 hours of aerial application, and extensive experience working with the FAA and local regulatory agencies to ensure safe aerial applications. The integration of UAS applications into our

fleet will support our existing lines of application business and will allow our programs to treat smaller acreage areas than our existing twin and single-engine aircraft. The pilots, staff and UAS Coordinator have a thorough understanding of the National air space system and are fully aware of the wind, weather, and other obstacles associated with conducting aerial applications as experienced while operating unmanned UAVs throughout the United States.

VDCI has the experience, skill set and knowledge to safely operate UASs and would like to provide the following Commercial services: application of granular and liquid insecticides for the control of mosquito larvae and adults, products for the management of weeds and other lake treatments, and right of way aerial applications. We are a very compliant company and understand it is necessary to request a Certificate of Waiver or Authorization to meet the legal requirements of the FARs. VDCI's exemption request would permit its operation of lightweight unmanned (remotely controlled in line of sight) aerial systems at or below 400AGL.

VDCI will be utilizing Leading Edge Aerial Technologies' PrecisionVision 35 UAS that is capable of carrying up to 35 pounds of granular materials or approximately 16 liters by volume. The PV35 utilizes six counter-rotating propellers for extreme balance, control and stability. The PV35 weighs less than 55 pounds (with a gross takeoff weight not to exceed 79lbs); excluding payload. Each of VDCI's small unmanned aircraft are designed to primarily hover in place and operate at less than 50 knots maximum speed. They are capable of vertical and horizontal operations and will be operated only within the line of sight of the remote control pilot. In addition to the remote control pilot, VDCI uses a visual observer, so at a minimum two VDCI personnel govern the safe flight of the aircraft at all times.

Utilizing battery power and not combustible fuels, flights generally last between five and twenty minutes. VDCI does not operate its aircraft with less than 30% battery power capacity. Safety systems in place include a GPS mode that allows the aircraft to hover in place if communication with the radio control pilot is lost or when the battery life reaches critical low and then "return to home". Further, our UAS has a "return to home" feature on the radio controller allowing it to safely and immediately return the designated home base with minimal effort.

The remote controller on the PV35 integrates video downlink and aircraft control into one system. The combined system operates at 2.4 GHz with a maximum signal transmission range of 5 km (unobstructed line of site). The device features a number of standard and customizable buttons that allow users to quickly access certain aircraft functions, such as taking and reviewing photos/videos, as well as controlling the gimbal, application system and PV iOS app.

VDCI intends to operate in sparsely populated areas without hazard to persons or property on the surface. In the event non-participating public enters our operational area we will cease operations until all non- participating public is cleared of the area.

As further evidence that VDCI's exemption will not adversely affect safety or how the exemption will provide a level of safety at least equal to the existing rule, VDCI submits the following representations:

- VDCI will only operate at or below 400 feet
- VDCI UASs will weigh less than 55 pounds, including payload, unless a specific and separate COA is approved
- VDCI will only operate for 5-35 minutes per flight
- VDCI lands its UASs when they reach 30% battery life
- VDCI will only operate while maintaining line of sight to UASs
- VDCI will operate with a certified remote control pilot and a visual observer
- VDCI's UASs have a GPS flight modes whereby they can stop, hover and return to home immediately with a single button push or if radio signal is lost
- VDCI will only operate in secured areas that are strictly controlled, are away from airports and populated areas
- VDCI conducts extensive briefings prior to flight, during which safety carries primary importance
- VDCI will log all flights
- VDCI always obtains all necessary permissions and permits prior to operation and will abort/suspend operations should a safety breach or potential danger develops

Similar to our fixed-wing application work, VDCI has prepared a detailed UAS Flight Operations Manual (FOM). The purpose of the FOM is to serve as the primary guidance document for all VDCI UAS operations. The UAS FOM has been previously submitted with our Exemption 18625. Within this document, we cite all relevant company guidelines including:

- Standard flight operating procedures along with preflight instructions
- Procedures for safe working procedures meant to minimize risk to the NAS or to persons and property on the ground
- Risk assessments for UAS services
- The number of currently licensed pilots
- The company organization with managers in charge of the operations
- Accident notification procedures
- Compliance standards with Federal Aviation Administration (FAA) regulations
- Pilot training, licensing and competency requirements

E. Summary

VDCI seeks an exemption from the following Regulations: 14 CFR 45.23; 91.7(a); 91.9(b)(2); 91.119(c); 91.121; 91.151(b); 91.203(a)&(b); 91.405(a); 91.407(a)(1); 91.409(a)(1)&(2); 91.417(a)&(b); 107.36; 137.19(c), (d), (e)(2)(ii), (e)(2)(iii), and (e)(2)(v); 137.31(a) and (b); 137.33(a) and (b); 137.41(c); and 137.42 to commercially operate its fleet of small unmanned vehicles and lightweight unmanned aircraft systems for the application of granular and liquid pesticides, herbicides, and other products for the control of mosquitoes, weeds, and other pests.

Granting VDCI's request for exemption will reduce current risk levels and thereby enhance safety. Currently, the uses outlined above relies primarily on the use of larger aircraft running on combustible fuels. Further, VDCI provides a level of safety at least equal to existing rules and in nearly every instance, greater than existing rules. It is far safer to operate a battery powered lightweight UAS than a manned helicopter or airplane. The potential loss of life is diminished because UASs carry no people, we only operate in sparsely populated areas and the extreme maneuverability allow our remote control pilots to avoid hazards. VDCI has operated and will continue to operate at and above current safety standards.

VDCI respectfully requests that the FAA grant its exemption request without delay.

Thank you for your time in the matter,



Daniel Markowski, PhD
VDCI Director of Aerial Operations
662-822-1270